HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Lilliwaup Creek Summer Chum Salmon Supplementation
Species or Hatchery Stock:	Summer chum salmon, *Oncorhynchus keta,* Lilliwaup Creek stock
Agency/Operator:	Washington Department of Fish and Wildlife / Long Live the Kings (USFWS funding)
Watershed and Region:	Lilliwaup Creek, Hood Canal, Puget Sound, Washington State
Date Submitted:	October, 1999
Date Last Updated:	

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

The purpose of this hatchery and genetic management plan (HGMP) template is to provide a single source of hatchery information for comprehensive planning by the state and the tribes, and for permitting needs under the Endangered Species Act (ESA). The information should be the best scientific and commercial information available, as it will help determine if hatchery programs are likely to meet their goals and ESA obligations.

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of Program
Lilliwaup summer chum Supplementation Project

1.2) Population (or stock) and species
summer chum salmon, *Oncorhynchus keta*, Lilliwaup Stock
and impacts to
chinook salmon, *Oncorhynchus tsawytscha*, Hood Canal Stock

1.3) Responsible organization and individual:
Name(and title): Rick Endicott, Hatchery Manager
Organization Long Live the Kings
Address: PO Box 21605 Seattle, WA 98111
Telephone: (206) 382-9555 (Seattle) (360) 877-6960 (Lilliwaup)
Fax: (206) 382-9913 (Seattle) (360) 877-9096 (Lilliwaup)
Email: lilli@hctc.com (Lilliwaup)

Other organizations involved in the program:
Washington Department of Fish and Wildlife (program administration); U.S. Fish and Wildlife Service (operational funding); Hood Canal Salmon Enhancement Group (co-operative work).

1.4) Location(s) of hatchery and associated facilities:
Washington State, Hood Canal
T23N, R03W, Sec 19 hatchery – river mile .5
weir – river mile .25

1.5) Type of program:
Integrated Recovery

1.6) Purpose (Goal) of program:
The goal of the Lilliwaup summer chum Supplementation Project is to contribute to the restoration of a healthy, naturally self –sustaining population of Lilliwaup Creek summer chum which maintains the genetic characteristic of the native stock.

1.7) Specific objective(s) of program
Supplement the indigenous summer chum population through artificial propagation and release of progeny secured from native broodstock for up to twelve years, speeding recovery of the population to abundances reflective of historic escapement levels.

1.8) List of Performance Indicators designated by "benefits" and "risks"
Reference Attachment 12D, Table 6, page 46

1.9) Approximate expected size of program
For the next three years (the first generation of the program), the expected releases will be between 25,000 and 50,000 fry. The 1998 release was 17,200 fry. Returning adults in U.S. waters will be protected through implementation of harvest management measures specified in the Hood Canal Summer Chum Conservation Plan, with overall exploitation rates expected to be under 10 %.

Specify expected releases, adult fish harvested, and escapement goals. For existing program, provide additional historic data for three generations, or for the number of years of available and dependable information.

1.10) Date program started or is expected to start:
The present program began in 1998. A previous, limited supplementation effort began in 1992.

1.11) Expected duration of program:
Three generations, 12 years

1.12) Watersheds targeted by program:
Lilliwaup Creek

SECTION 2. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

2.1) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates. Indicate whether this HGMP is consistent with these plans and commitments, and explain any inconsistencies.
This program operates within the structure and protocols established in the "Artificial Production and Evaluation Plan for Summer Chum Salmon Populations in the Hood Canal and Strait of Juan de Fuca Regions", Attachment 12D, with additional oversight and technical support provided by PNPTC and WDFW.

2.2) Status of natural populations in target area.
For "integrated" programs (i.e., supplementation programs or other programs that involve close integration with a specific natural population), identify the natural population targeted for integration.
The natural population targeted for the integrated recovery program is the Lilliwaup Creek summer chum stock. The Co-managers have assigned a "high" extinction risk rating for this population through the Hood Canal Summer Chum Conservation Initiative.

2.2.1) Geographic and temporal spawning distribution.
Geographic distribution for both species:
Lilliwaup Creek from mouth to falls (RM 0 to .7)

Summer chum run timing is approximately Aug 15- Oct. 15.
Chinook run timing is approximately Aug 15 – Nov 1.

2.2.2) Annual spawning abundance for as many years as available.
Summer chum spawning abundance
Reference Attachment 12B.

Chinook spawning abundance
1998 – 58 chinook
no other data available

2.2.3) Progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for as many brood years as available.
Data are not available to identify these parameters for the supplemented summer chum population.

2.2.4) Annual proportions of hatchery and natural fish on natural spawning grounds for as many years as possible.
Summer chum
Unknown
There are no records or anecdotal evidence of any summer chum artificial production in Lilliwaup Creek prior to 1992.

2.2.5) Status of natural population relative to critical and viable population thresholds.

The Lilliwaup summer chum population is at high risk of extinction. Reference Attachment 12D, pages 49 and 183 (page 5 of the "Extinction Risk" addendum.)

The status and viability of natural Hood Canal chinook populations have not yet been determined.

2.3) Relationship to harvest objectives
Include past harvest rates and expected future harvest rates on fish propagated by the program and on natural populations in the target area. Explain whether artificial production and harvest management have been integrated to provide as many benefits and as few biological risks as possible to the listed species.
Past harvest rates and expected future harvest rates on fish produced through the proposed program are detailed in the Harvest Management Plan section of the Hood Canal Summer Chum Salmon Conservation Initiative (see Attachment 12C, Table 3.7). Artificial production and harvest management plans have been integrated through the Hood Canal Summer Chum Salmon Conservation Initiative to recover regional stocks to healthy, sustainable levels.

2.4) Relationship to habitat protection and recovery strategies.
Reference attachment 12E, Summer Chum Salmon Conservation Initiative - Habitat Recovery Draft Plan, pages B42 – B44.

2.5) Ecological interactions
Describe salmonid and non-salmonid fishes or other species that could (1) negatively impact program; (2) be negatively impacted by program; (3) positively impact program; and (4) be positively impacted by program. Give careful considerations to the unlisted but listable indigenous species.
Lilliwaup summer chum serve as prey for resident fishes in the local freshwater and estuarine

systems. Predators likely include juvenile steelhead, cutthroat, juvenile coho and sculpin. Chinook salmon that interact with released summer chum fry may benefit from the program, if the chinook are a large enough size to allow for predation.

Summer chum are unlikely to prey on other fishes, and no species are expected to be negatively impacted through elevated predation risk by the program.

Competition for food resources may occur between hatchery-origin summer chum fry and pink salmon fry, and program summer chum and natural-origin fall chum in Hood Canal marine waters. The summer chum program intends to produce fry sufficiently large to feed in deeper water, offshore habitats, where competitive impacts with smaller, shoreline oriented, natural fry are reduced. Pink salmon are present in odd-numbered brood years, are limited in numbers, and have co-evolved with the summer chum populations. Summer chum will be released and emigrate from the estuary before chinook salmon juveniles enter the estuary. Fall chum released from Hood Canal hatcheries during the summer chum emigration period may compete with Lilliwaup summer chum fry for potentially limiting food resources in marine waters.

Spawning habitat conflicts between Lilliwaup summer chum indigenous salmon populations will be rendered moot by collection of 100% of returning Lilliwaup Creek summer chum for hatchery production. It is not anticipated that the program will create a negative impact on the spawning behavior of any of the other salmon species or on naturally-produced summer chum.

During outdoor rearing at the hatchery, bird predation will be prevented with bird netting covers on all summer chum rearing tanks.

Harbor seals may prey on returning summer chum adults. The magnitude of this predation relative to the total Lilliwaup summer chum return is currently being evaluated by marine mammal researchers from WDFW.

Naturally spawning chinook salmon will have a take on them as they are trapped during the August 15 – October 15 trapping window. There will be a stress, trapping, and handling take on approximately 50 fall chinook. There is no expected mortality on the chinook.

However, the Lilliwaup chinook population may also experience a long-term benefit to the health of the gene pool, as any fin-clipped hatchery fish intercepted in the trap will be removed from the population.

SECTION 3. WATER SOURCE

Specify source (spring, well, surface, etc.), water quality profile, and any differences between hatchery water and water used by the naturally spawning population.
The Lilliwaup facility water originates from Beardslee Creek, a surface water tributary to Lilliwaup Creek. Beardslee Creek is generally several degrees warmer than Lilliwaup Creek, and may respond more quickly to changes in air temperature. Detailed thermograph data will be collected during the upcoming incubation period to provide a more precise overview of the thermal differentiation.

SECTION 4. FACILITIES

Provide descriptions of the physical plants listed in this section, and three additional sets of information.

One, for programs that directly take listed fish for use as brood stock, provide detailed information on catastrophe management, including safeguards against equipment failure, water loss, flooding, or other events that could lead to a high mortality of listed fish.
Reference Attachment 12F.
A water-flow alarm will be installed at Lilliwaup prior to August 15, and standby volunteer staff will be available to respond to an alarm within five minutes. In the event of an expected freshet, hatchery personnel will remain overnight at the facility. The Lilliwaup facility has a hatchery water supply, a domestic water supply, and a backup hatchery water supply to be used in the event of emergency. There is also support from Hoodsport and George Adams hatcheries, which can provide trash pumps to pump water from Lilliwaup Creek into fish holding tanks if necessary. Fish can also be transported off-station to either WDFW facility within 12 hours if necessary.

Two, describe any instance where construction or operation of the physical plant results in destruction or adverse modification of critical habitat designated for the listed species.
The instream weir and adult fish trap may have a very small adverse impact on summer chum spawning habitat – however, this concern is rendered moot by the collection of 100% of the Lilliwaup Creek summer chum for hatchery production.

The same structures may have a small adverse impact on chinook spawning habitat. This impact is minimized by placement of the structure at the furthest downstream extent of potential spawning habitat.

Three, describe any inconsistencies with standards and guidelines provided in any ESU-wide hatchery plan approved by the co-managers and NMFS.
The proposed supplementation program is entirely consistent with standards and guidelines detailed in the artificial propagation plan portion of the Hood Canal Summer Chum Salmon Conservation Initiative.

4.1) Brood stock collection
A weir and adult fish trap will be place in Lilliwaup Creek at the furthest downstream point of observed spawning activity. The trap will be checked at least once per day, and in the event of a freshet hatchery personnel will stay on station and check the trap every two hours. If it is determined that there is a risk to fish life, the trap will be opened to allow free passage of fish through the trap.

4.2) Spawning
Spawning will take place in the Lilliwaup hatchery building.

4.3) Incubation
Green eggs will be incubated in heath trays inside the Lilliwaup hatchery building. Trays will be loaded with one female's eggs per tray. Eyed eggs will be shocked and picked then transferred to 55 gallon RSI barrels set up inside the Lilliwaup hatchery building. Use of the RSIs allows for volitional release of emerging fry.

4.4) Rearing
Emergent fry release into 4' circular tanks inside the Lilliwaup hatchery building. Feed is begun inside, then the fish are transferred to 20' circular tanks located outside.

4.5) Acclimation/release
There are no structures associated with acclimation or release.

4.6) Other
None.

SECTION 5. ORIGIN AND IDENTITY OF BROOD STOCK

5.1) Source
Native summer chum adults returning to Lilliwaup Creek.

5.2) Supporting information

5.2.1) History
Provide a brief narrative history of the brood stock sources. For natural populations, specify its status relative to critical and viable population thresholds (use section 2.2.5 if appropriate). For existing hatchery stocks, include information on how and when they were founded, and sources of brood stock since founding. If stock crosses, list stock of each sex.
Summer chum broodstock were first secured from the native run in Lilliwaup Creek in 1992. No other summer chum stocks have been transferred into the drainage, or are planned for use in future years, through the supplementation program. The natural population has been assigned a "high" extinction risk status by the Co-managers.

5.2.2) Annual size

Reference Attachment 12D, page 88.

BY	natural spawners	broodstock	# fry released
92	90	18	~20,000 (unfed)
93	72	10	~12,500 (fed)
94	105	12	~15,000 (fed)
95	79	0	
96	40	12	~15,000 (fed)
97	10	18	~12,000 (fed)
98	3	22	17,200 (fed to .74 gr)

*For BY 92 – 97, these escapement numbers represent WDFW survey. These numbers are disputed by LLTK hatchery manager Rick Endicott, who has collected all summer chum broodstock since BY 94. Based on his experience with the stream and the summer chum returns, Mr. Endicott believes the actual escapements are lower than WDFW data indicate. Further, Mr. Endicott's experience is that a disproportionate number of returning summer chum are males, impacting the effective population size.

The 1998 escapement number represents data collected from the operation of a weir in Lilliwaup Creek from August 31, 1998 through October 13, 1998, plus observations of fish that spawned below the trap or bypassed the trap in high flow events. These observations were the result of regular stream surveys.

Include past brood stock sizes as well as proposed future sizes. Specify number of each sex, or total number and sex ratio, if known. For natural population brood stocks, explain how their use will affect their population status relative to critical and viable thresholds.

5.2.3) Past and proposed level of natural fish in brood stock.
If using an existing hatchery stock, include specific information on how many natural fish were incorporated into the brood stock annually.
N/A

5.2.4) Genetic or ecological differences
There are no known genetic differences between the naturally-spawning population, and fish used as broodstock for the supplementation program.

5.2.5) Reasons for choosing
The Co-manager's "Artificial Production and Evaluation Plan" within the Hood Canal Summer Chum Salmon Conservation Initiative specifies that only native Lilliwaup broodstock may be used for supplementation in the watershed. The proposed program is consistent with that plan.

5.3) Unknowns
Identify areas where a lack of data leads to uncertainties about the choice of brood stock.
There are no known areas where a lack of data would contribute to any uncertainties at this time.

SECTION 6. BROOD STOCK COLLECTION

Describe any inconsistencies with standards and guidelines provided in any ESU-wide hatchery plan approved by the co-managers and NMFS.

The proposed program is consistent with broodstock collection criteria set forth in the Co-manager's "Artificial Production and Evaluation Plan" of the Hood Canal Summer Chum Salmon Conservation Initiative.

6.1) Prioritized goals

List in order of priority the general goals for brood stock collection. Refer to sections 1.5 and 1.6.

Reference Attachment 12D, pages 88-90.

6.2) Supporting information

6.2.1) Proposed number of each sex.

At current run sizes, up to 25 of each sex are proposed for collection. Reference Attachment 12D, page 16.

6.2.2) Life-history stage to be collected (e.g., eggs, adults, etc.)

Adult fish in the Lilliwaup watershed.

6.2.3) Collection or sampling design

Include information on the location, time, and method of capture. Describe capture efficiency and measures to reduce sources of bias that could lead to a non-representative sample of the desired brood stock source. Also, describe the method of capture (e.g. weir trap, beach seine, etc.) and quantify as take handling, behavior modification, stress, or mortality of listed fish.

From August 15 to October 15 a weir and adult fish trap will be operated at the most downstream point of observed spawning activity. This location is well below the uppermost point of tidal influence, and spawning below the trap is not anticipated. Collection of the entire run will eliminate collection bias. There will be a mortality take of 50 summer chum, with all gametes being transferred to supplementation program.

Weir operation will be supplemented with regular surveys to ensure capture of the entire summer chum run. Fish that have avoided the trap will be collected with the hook-and-line capture method.

6.2.4) Identity

Describe method for identifying (a) target population if more than one population may be present; and (b) hatchery origin fish from naturally spawned fish.

There are no external marks on hatchery produced Lilliwaup summer chum, and therefore no means of visually identifying naturally-spawned versus hatchery spawned fish. However, given the program goal to collect 100% of returning adult summer chum for supplementation (beginning in 1998), it is anticipated that virtually 100% of returning adults beginning in 2002 will be hatchery origin fish. Beginning in 1998, all hatchery-origin summer chum have been otolith marked, so proportions of hatchery and natural-origin fish can be ascertained post-spawning beginning in 2002 and subsequent years.
(See 6.3 below.)

6.2.5) Holding

Describe procedures for holding fish, especially if captured unripe or as juveniles. Quantify as take trapping, holding, stress or mortality of listed fish.

Summer chum

Adults will be segregated by sex and held in 8' circular outdoor tanks until they are spawned. There will be a spawning mortality on the entire summer chum run, estimated at 50 fish.

Chinook

Returning chinook may be intercepted in the trap during the period of operation. Unmarked fish will be released upstream of the weir on a daily basis. There will be a trapping and handling take on an estimated 50 chinook as a result of trap operation. (Adipose clipped chinook will be removed from the spawning population.)

6.2.6) Disposition of carcasses

Scales, otoliths, and GSI samples are removed from carcasses immediately after spawning, and all carcasses are returned to Lilliwaup Creek.

6.3) Unknowns

Identify any data gaps that lead to uncertainties about brood stock collection.

The lack of any external or internal marks on those summer chum produced between 1992 and 1997 prevent identification of returning fish as either naturally spawned or hatchery spawned fish.

SECTION 7. MATING

Describe any inconsistencies with standards and guidelines provided in any ESU-wide hatchery plan approved by the co-managers and NMFS.

Mating protocol applied in the proposed program is fully consistent with criteria set forth in the Co-manager's "Artificial Production and Evaluation Plan" of the Hood Canal Summer Chum Salmon Conservation Initiative (see Attachment 12D, pages 73-74).

7.1) Selection method

Specify how spawners are chosen, e.g. randomly over whole run, randomly from ripe fish on a certain day, selectively chosen, prioritized based on hatchery or natural origin, etc.

The entire Lilliwaup summer chum run will be collected for supplementation, eliminating any selection bias. Female summer chum will be held in outside tanks until ripe. Females will be hand-checked for ripeness daily, and will be spawned within 12 hours of ripeness being determined.

7.2) Males

Specify expected use of backup males and repeat spawners.

Males will be used in the order captured, and will be live spawned until each male spawns with at least two and preferably three females. Back-up males are used to ensure fertilization.

7.3) Fertilization

Describe fertilization scheme, such as equal sex ratios and 1:1 individual matings; equal sex ratios and pooled gametes; or some other. Explain any fish health procedures used for disease prevention.

Spawning will be conducted using the 3x3 factorial method whenever possible, with back-up

males used to ensure fertilization. This fertilization method conforms with criteria set forth in the ESU-wide hatchery plan, which requires at least 1x1 spawning.

7.4) Cryopreserved gametes
Cryopreservation is not presently used or needed as a means to preserve semen.

7.5) Unknowns
Identify any data gaps that lead to uncertainty in mating protocols.
No data gaps are as yet known.

SECTION 8. REARING AND INCUBATION

Provide current and previous goals and data. Include historic data for three generations or for years dependable data are available. Also, describe any inconsistencies with standards and guidelines provided in any ESU-wide hatchery plan approved by the co-managers and NMFS.

INCUBATION:
Reference Attachment 12D, page 77.

8.1) Loading density
Include description of the incubator(refer to Section 4.4). Also, provide measurement of egg size.
Green eggs – 2,500 per heath tray
Eyed eggs – 10,000 eggs per 55 gallon RSI (inside hatchery)
Fry – 2,500 per 4' circular inside tank
Fry moved to 20' circular outside tank, at 25,000 per tank.

8.2) Influent and effluent gas concentration
(Dissolved Oxygen, and any other parameters monitored)
Influent and effluent gas concentrations, including dissolved oxygen levels, are at levels optimal for salmonid propagation.

8.3) Ponding
Describe degree of button up, cumulative temperature units, and mean length and weight (and distribution around the mean) at ponding. State dates of ponding, and whether swim up and ponding are volitional or forced.
Fry volitionally release from RSIs inside hatchery building and enter 4' circular tanks. TUs ranged from 900 to 2,000 at swim-up. Swim-up dates ranged from January 14 to February 7. Mean weight at swim-up was 0.33 grams. Length measurements were not taken.

8.4) Fish Health monitoring
Describe any diseases, yolk-sac malformation, and mortality.
Summer chum incubated in 1998 had no diseases and no observed yolk-sac malformation.
Green egg to eyed egg mortality was 7.57%.
Eyed egg to released fry mortality was 1.46%
Total program mortality was 8.923%.
Fish health will be monitored through compliance with Co-manager Fish Health Policy procedures.

REARING:
Reference Attachment 12D, pages 77-80.

8.5) Density and loading.
Include a description of the rearing containers, such as start tanks, circulation, circulating ponds, flow through, etc. Refer to section 4.4.
Emergent fry release into 4' circular tanks and are held at a maximum density of 2,500 fry per tank. After feed is introduced the fry are moved to outside 20' circular tanks at a density of 25,000 fry per tank.

8.6) Influent and effluent gas concentrations
(oxygen, carbon dioxide, total gas pressure).
Influent and effluent gas concentrations, including dissolved oxygen levels, are at levels optimal for salmonid propagation.

8.7) Length, weight, and condition factor.
Summer chum fry egressing from the RSIs for rearing will average approximately 35-36 mm in length, with an average weight of 0.36 grams, or 1,200 fpp. Fish will average 56 mm at release. The target individual fish weight at release is 1 gram, or 450 fpp.

8.8) Growth rate, energy reserves
(hepatosomatic index - liver weight/body weight) and body moisture content as an estimate of body fat concentration.
Growth rate will be maximized during the 30 to 45 day rearing period to achieve a fish size that minimizes predation loss and maximizes survival to adult return.

8.9) Food type and amount fed, and estimates of feed conversion efficiency.
BioDiet Starter for 2 weeks, then BioDiet Grower. Fish will be fed at a rate of up to 3.0 % body weight of the population per day. The expected food conversion factor is 1.2.

8.10) Health and disease monitoring.
Health and disease monitoring will be in compliance with Co-manager Fish Health Policy criteria.

8.11) Smolt development indices, if applicable
(e.g. gill ATPase activity).
All chum salmon are fully smolted upon swim-up.

8.12) Use of "natural" rearing methods.
The level of intervention involved with chum salmon fry propagation is very low, with fish rearing confined to a 30 to 45 day period. Fish are allowed to emerge and emigrate volitionally whenever possible. All interior tanks are covered to provide shade, and the use of overhead

lights inside the hatchery facility is minimized while fry are rearing inside. Where possible, feed is introduced to fry via influent water to minimize any risk of domestication that might ostensibly occur over the minimal amount of time that the chum salmon are reared.

8.13) Unknowns
Describe data gaps that lead to uncertainty in the incubation and rearing protocols.
None known.

SECTION 9. RELEASE

Provide current and previous goals and data. Include historic data for three generations or for years dependable data are available. Also, describe any inconsistencies with standards and guidelines provided in any ESU-wide hatchery plan approved by the co-managers and NMFS.
Reference Attachment 12D, pages 80-83.

9.1) Life history stage, size, and age at release.
Program goals are to release fed fry during the natural-origin summer chum emigration period at an average, individual fish size of 1.0-1.5 grams, approximately 1 month after swim-up.

9.2) Life history stage, size and age of natural fish of same species in release area at time of release.
No natural-origin fish are expected in the release area at time of hatchery-origin fry release.

9.3) Dates of release and release protocols.
BY 98 fry release was on February 24th. Future releases are planned on the first appropriate day, with regard to tides, after March 1.
Releases are forced, in the evening, timed to coincide with a receding high tide.

9.4) Location(s) or release.
Lilliwaup Creek, at the hatchery.

9.5) Acclimation procedures.
Fish will be incubated and reared in the home watershed.

9.6) Number of fish released
BY 98 fry release was 17,200. Future releases are expected to range from 25,000-50,000 for the next three years.

9.7) Marks used to identify hatchery adults.
Since 1998 all hatchery produced Lilliwaup summer chum have thermally marked otoliths. There are no external marks on hatchery-produced summer chum at the Lilliwaup facility form 1992 to present.

9.8) Unknowns
Describe data gaps that lead to uncertainty in the release protocols.
None known.

SECTION 10. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

Reference Attachment 12D, pages 21-25.

SECTION 11. RESEARCH

Provide the following information for any research programs conducted in association with the HGMP. Correlate with research described in any ESU hatchery plan approved by the co-managers and NMFS.

11.1) Objective or purpose
Collection of baseline biological information on summer chum salmon native to Hood Canal. Information collected will include fecundity, egg size, reproductive effort, pathogen screening, DNA/GSI sampling, gamete viability, occurrence of monstrosities in off-spring, and otolith-marking of all off-spring to estimate fry-to-adult survival rates in the supplemented population.

11.2) Cooperating and funding agencies
Washington Department of Fish and Wildlife.

11.3) Principle investigator or project supervisor and staff
Dr. Steve Schroder, Fisheries Research Scientist

11.4) Status of stock, particularly the group affected by project.
The Co-mangers have assigned a "high" extinction rating for this population.

11.5) Techniques: include capture methods, drugs, samples collected, tags applied
See above text for capture methods. Any drugs used will be applied consistent with Fish Health Policy procedures. Samples collected will include tissues from hard parts, flesh and internal organs for viral, GSI, and DNA samples**.** Ten eggs will be collected from each female for egg size determination. Scales will be removed for age determination. Beginning in 2000, otoliths will be sampled to determine origin of returning fish. Mortality data for the propagated population will be collected during the incubation and rearing period. Length, weight, and condition factor data will be collected from fry produced at release**.**

11.6) Dates or time period in which research activity occurs
Research activities will occur from late August through the following March each year.

11.7) Care and maintenance of live fish or eggs, holding duration, transport methods
N/A

11.8) Level of take: number or range of fish handled, injured, or killed by sex, age, or size
See above text. Research activities described above will not lead to an increased take level.

11.9) Potential for / estimates of injury or mortality, and methods to reduce either.
Injury or mortality levels will not increase because these activities will be a part of, and directly linked to, the standard hatchery procedures proposed in this HGMP.

11.10) Alternative methods to achieve project objectives
None.

11.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project
None anticipated.

SECTION 12. ATTACHMENTS AND CITATIONS

Attach or cite (where commonly available) relevant reports that describe the hatchery operation and impacts on the listed species or its critical habitat. Include any EISs, EAs, Biological Assessments, or other analysis or plans that provide pertinent background information to facilitate evaluation of the HGMP.

A. does not exist, included for consistent numbering between templates.
B. Summer chum salmon spawning escapement estimates for Hood Canal/Strait of Juan de Fuca 1968-1998, from Part 1, Summer Chum Salmon Conservation Initiative, Table 1.1
C. Summer chum harvest rate summary, from Summer Chum Salmon Conservation Initiative, Harvest Management Plan draft, Table 3.7.
D. Summer Chum Salmon Conservation Initiative, Artificial Production and Evaluation Plan, draft dated June 11, 1999. *Not attached*
E. Summer Chum Salmon Conservation Initiative, Habitat Recovery Plan, draft dated March 23, 1999. *Not attached*
F. Catastrophe Response Protocols, Lilliwaup Summer Chum Program, Broodyear 1999.

Attachments -

F. Catastrophe Response Protocols, Lilliwaup Summer Chum Program, Brood year 1999.

Risk Assessment and Staffing Procedures
The Lilliwaup Hatchery facility will have two different staffing procedures depending on the daily risk assessment. Risk assessment will be either "high risk" or "low risk", to be determined by hatchery manager Rick Endicott. This assessment will be based on weather conditions and river level.

During low risk periods, the caretaker of the Lilliwaup Hydroelectric Plant, Rob Allen, will be the primary on-site respondent. Mr. Allen lives immediately adjacent to the hatchery facility. In the event of a low-water alarm, Mr. Allen will immediately notify Mr. Endicott, and he will respond to the facility. Mr. Allen is a former employee of Long Live the Kings and is qualified and trained to conduct the steps outlined in "Catastrophe Response Procedures" below.

During high risk periods, the Lilliwaup facility will be staffed 24 hours per day by LLTK staff.

Catastrophe Response Procedures
There are two types of catastrophes possible at the Lilliwaup facility: heavy silt load in the water supply, or cessation of water flow. The procedures are slightly different for each type of catastrophe, and for each life stage. The following procedures are only intended as immediate response measures, and are anticipated to maintain fish for one hour, until hatchery staff can respond and assess the situation.

Silted Water Supply
Reduce flow to all heath trays, RSIs, and rearing tanks.
Open the mainline clean-out valve located at the south end of the facility.
Observe all tanks for signs of fish distress.

Resume normal water flow and close clean-out valve when water supply clears.
If silt is extremely heavy, flow may have to be discontinued to eggs and fish, and the procedures for cessation of water supply will be followed.

Cessation of Water Supply
Notify Rick Endicott.
Turn off mainline valves to all eggs and fry to prevent intrusion of silt-laden water.
Drain all heath trays and keep lights off in incubation room.
Open the mainline clean-out valve located at the south end of the facility.
Engage the back-up water supplies, with priority to summer chum.
Observe all tanks for signs of fish distress.
Keep eggs in heath trays moist.

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Summer chum salmon ESU/Population: Hood Canal Summer Chum ESU / Lilliwaup Activity: Supplementation				
Location of hatchery LLTK Lilliwaup Hatchery **Dates of activity: August -May Hatchery program operator: Long Live the Kings**				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				100
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			100	
Intentional lethal take f)				
Unintentional lethal take g)			2	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild.
h. Other takes not identified above as a category.

***Instructions*:**
1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.